Evaluation of case-based measles surveillance system in East Java Province in 2018

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Abstract:

Measles is one of the five diseases which becomesa leading cause of child mortality in the world. Measles in East Java from 2014 to 2017 has increased from 762, 2367, 3913, to 4936 cases. The problem is that measles remains endemic in Indonesia and Indonesiahas poor quality of a Case-Based Measles Surveillance(CBMS) system implementation which leads to the lack of epidemiological information.*Aim*: This study purposes toevaluateCase-Based Measles Surveillance system in East Java Province in 2018 based on the attributes of simplicity, flexibility, data quality, acceptability, timeliness, representativeness, and stability.*Method***:**This studywas a descriptive study which utilized a qualitative approach in analyzing the data.*Result:*The evaluation results of CBMS system implementedin East Java based on the following attributes were: simplicity (officer hadnever received any training and there wasonly one officer, thus the quality of the officerwas belowstandard),flexibility (no change), data quality (completeness only reached 16%), acceptability (regarding the implementation of CBMS by the district government, only 29% met the targets, 79% did not meet the targets, 5% did not implement CBMS, and no data from the hospitals or the private sectors), timeliness (on-time 5.7%), representativeness (lack of accurate information), and stability (less reliable).*Conclusion:*The CMBS system implementedis complicated, less acceptable, less representative, less timeliness, and not stable.

Keyword:surveillance, evaluation, attribute, measles

1. Introduction

Infectious diseases are looming large in Indonesia. Between2010 and2015, it was estimated that there were 23,164 cases of measles. The number of cases estimated is still low compared to the actual figures in the field since the completeness of measles surveillance is low and the number of unreported cases from the private services is high (1).Measles is caused by a virus in the paramyxovirus family. The virus is transmittedvia airbornerespiratory droplets (spit) of infected people. Most cases of measles amongchildrenoccur inpreschool and elementary school age children.The datafromthe Provincial Health Office of East Java recorded that the coverage of Universal Child Immunization (UCI) in East Java in 2015 was as many as 76.47%,this number decreased compared to that of 2014 (87.50%).Decreased immunization coverage resulted in increased cases of measles in East Java, which originally had dropped in 2014 as many as 762 cases, then increased in 2015 as many as2367 cases, in 2016 rose to 3,913 cases, and in 2017 rose again to 4936 cases (2).

Measles virus (MeV) is an aerosol-borne pathogens and one of the most contagious viruses known. Almost every MeV infection causesclinical manifestations that lead to serious and even fatal complications, especially undermalnutrition conditions that mostly occur in developing countries, where there are still 115,000 to 160,000 patients die from measles every year. No specificantiviral treatment has been done. In addition, MeV infection causes durable memory B and T cells damage,

making people vulnerable to opportunistic infections for years. Long-term consequences are fatal subacute sclerosing panencephalitis(3).

The Council os States and Territoral Epidemiologist (CSTE) definition of measles is a disease characterized by rash lasting for 3 days; a temperature of 38.3 C; and cough, coryza, or conjunctivitis. In addition, patients suspected to have measles mostly experience fever accompanied by a maculopapular rash as one of the symptoms (4).

Severe measles is more likely to occur in children who are malnourished, especially those who are deficient in vitamin A, or whose immune systems have been weakened by HIV / AIDS or other diseases. The most severe complications include blindness, encephalitis (an infection that causes swelling of the brain), severe diarrhea, and related dehydration and acuterespiratory infections such as pneumonia.

While global measles deaths have declined 84%worldwide in recent years, from an estimated of 550,100 deaths in 2000 to 89,780 in 2016, measles is still prevalentin many developing countries, especially in several parts of Africa and Asia. An estimated 7 million people were exposed to measles in 2016. The majority (over 95%) of measles deaths occur in countries with low per capita incomes and weak health infrastructures (5).

Despite the availability of a safe, effective and inexpensive vaccine, measles remains an important cause of preventable deaths worldwide among children aged less than5 years. Measles virus is highly contagious asin the pre-vaccination era, there are more than90% of people under the age of 15 years infected by the virus. Complications of measles include diarrhea, otitis media, laryngotracheobronchitis, pneumonia and encephalitis. Pneumonia and diarrhea arethe maincauses of death. Adults aged over 20 yearsare at highest risk of fatal measles compared toother children younger than 5 years of age, solid occupancy,havingvitamin A deficiency and immunological abnormalities, such as advanced HIV infection. In developing countries, the case fatality rate of measles among children may reach 5-10%. In industrialized countries, measles deaths, although rare, can occur in previously healthy individuals(6).

Measlescase reports received in passive surveillance system of medical facilities are collected fromboth private and public clinics. However, for various reasons, doctors often fail to report cases of measles. Thus, it is necessary to verify that any incidence reduction of measles arebecause of the actual decline in disease incidence, not due to the failure of the surveillance systems (7).

Inadequate notification is a recognized problem of measles surveillance systems in many countries. In recent times, several countries have been replacing the measles surveillance system by introducing additional systems to improve the reporting of cases. In Japan, only sentinel medical facilities reported cases of measles until December 2007. In January 2008, all medical facilities in Japan wererequired to report every measles case. In France, because the cases were not reported seriously, mandatory notification formeasles was replaced by sentinel surveillance system in 1985(8), (9).

Vital strategy of the program targets the elimination of case detection (by relying on vaccine coverage) which helpsus in building a surveillance program that allows us to determine which factor causes the failure of the vaccine versus the failure of thevaccination. Since in some cases some people do not respond to their initial vaccination, as a result, a routine two-dose vaccination schedule is recomended. The focus of surveillance system is acting as adriving force in transmiting relevant data so that the actual outbreak of measles is known and the policy makers can makeappropriate decisions. The momentum ofeliminating measles allows us to develop some elements in making a strong immunization program. Similarly, in China, an effort in the early 2000s to speed up measles elimination and strengthen routine immunization in one province (Guizhou) provided a model for achieving these goals nationally(10).

The strategies outlined are to strengthen routine vaccination, enforcement of schoolrequirements, and supplementary immunization activities and also strengthen measles surveillance. Case-based surveillance helps identifying pockets of children who are less immunized and preventing further spread. These approaches help the government to focus on financing and facilitating the development of an internet-based registration system to improve the accuracy of immunization records and further identify the performance in all areas which are applicableeither for a wider geographical area or other disease control programs(11). In Indonesia, measlesremains endemic. The lack of information regardingCase-Based Measles Surveillance(CBMS) includes genotype information, the absenceof

CBMS report from the private sector, and the delay in the data causing a real bottleneck (5). Based on the problems above, it is necessary to conduct a research to evaluate the CBMS system in East Java Province in 2018 based on the following attributes:simplicity, flexibility, data quality, acceptability, timeliness, representativeness, and stability.

2. Research Method

This researchwas classified as a descriptive evaluation study.Utilizinga qualitative approach,the primary and secondary data of Case-Based Measles Surveillance system evaluation were gained from 38 districts in East Java in 2018. The data collection method employed observation and interview. The observation intended to observe the Case-Based Measles Surveillancesystemimplementation, while the interview meaned to see the input, process, and output aspects of the system. Input consisted of human resources, materials, and method. While process covered data collection, data compilation, data analysis and data interpretation. Output included simplicity, flexibility, data quality, acceptability, timeliness, representativeness and stability. Instruments used to support the collection of data were field note checklist and mobile phone. The current study also appliedpurposive sampling technique to determine the key informant.The key informant was the administratorof the Case-Based Measles Surveillancesystem in East Java province,managing 38 districts. This evaluation studywas performed in the form of areview. The present research was conducted to determine to whatextent the program was implemented and to whatextent the program createdeffects(12).
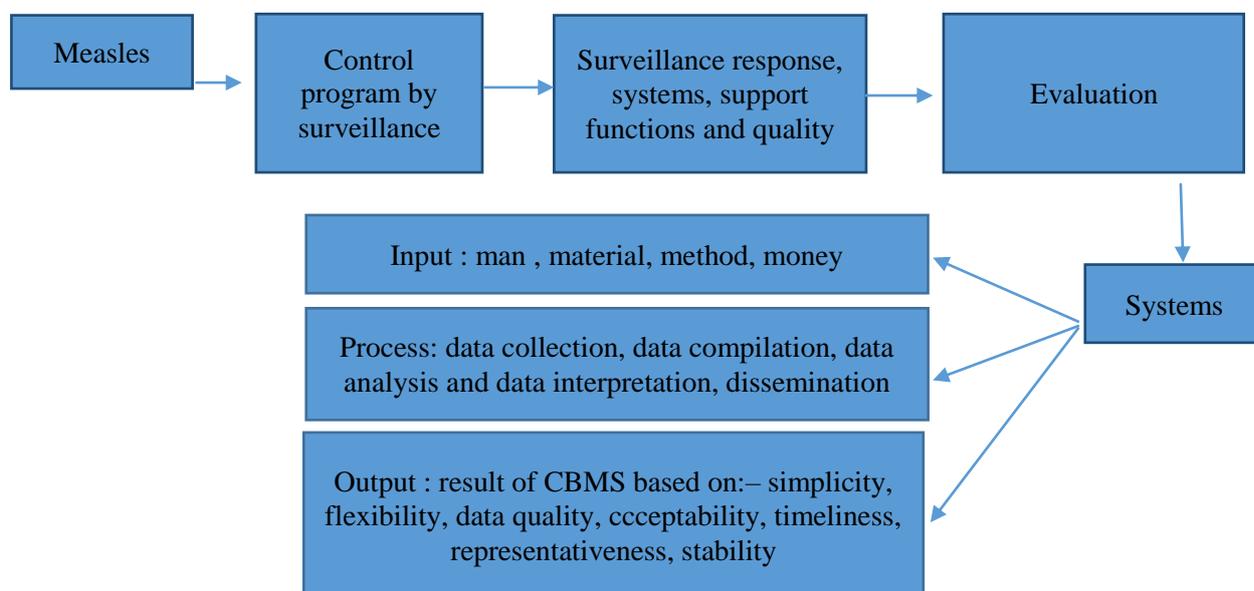
3. Results

The result of this study showed the variables in details, establishing some quotes from the informant and also the qualitative result.

3.1 Input
Man: "I graduated from the Departmentof Health Administration and Policy, as a surveillance officer, but I have never attended any special training on measles surveillance. I only join several socializations from the central health office "
Material:a) electro-media network, b) computers and accessories, and c) references of surveillance, research and health study. District Office of CBMS system used 5% but there is no use of CBMS system. Data obtained from the level below the provincial health office received via email in the form of aggregate data.
Method:"Collecting data passively and coming to the district only if there is an outbreak and thenconducting an epidemiology investigation"
Money"There is no special fund for measles surveillance, so there is no surveillance officers training due to the fund sharing system."

3.2 Process

Data collection: The interview result explicated that there   were several national measles laboratory in Indonesia, one of them was the Center for Health Laboratory of Surabaya(BBLK Surabaya). The number of officers collecting reports wasone person. The regional health office sentthe data via email in every 10th monthly report of Regency/City by 1.1% (until 1 June 2018) while the number of data collection accuracy is by 5.7% (data dated 10 January 2019). Only 29% of the data was complete.The samples collected from thedistricts did not directly send to BBLK but to the province so the complete data could posibly not be accumulated. Generally it took 28 days to obtain the result, but it might be longer due to the absence of the reagents.

Data compilation:Compilation of data wasdone by inserting measles surveillance reports from the regional health officeinto computer applications such as Microsoft Excel with column, place, and time criteria. Itwasdone on time every month by a surveillance officer.

Data analysis and interpretation: The data was collected fromemail and then compiled, analyzed and interpreted in tabular form using Excel. Almost all of the districts did not analyze the data. The aggregate data changedintothe provincial form, then the data were sent via email to the general infectious diseasesprevention and control unit.

Dissemination: During 2017 and 2018 there was no dissemination due to the limited number of the personnel. Since the only staff doing the measles surveillance tasks performing other surveillance tasks, there were no measles related bulletin made, only feedback sent after reporting.

3.3 Output

Simplicity: The data collected neededconfirmation from BBLK Surabaya. However, since the stock of reagents was limited and the examination took 28 days, several cases were usuallynot confirmed. Theresultsweredirectly sent to the directorate general of disease control and environmental health. The data received would also getfeedback and reported to the Provincial Government of East Java.

Flexibility: There was no change in the system implementation in 2018.

Data quality: From the data received, only 16% is complete. The data didnot contain parents' names, address, district, date of last measles vaccination. Some of the data missed several data related to the initial pain felt by patients, the date of the report received, the schedule of Vitamin A administraton, and the last state experienced by the patient. All of the data could only be obtainedfrom the health center.

Acceptability:16% hit the target, 79% did not meet the target, and 5% did not implement CBMS. The completeness only reached 29%. The reporst only obtained from from the community health center, not fromhospitals and private clinics.

Timeliness: The accuracy of the monthly report from the regional health officewas 1.1% (until June 1, 2018), while the accuracy of the data collection was5.7% (data dated January 10, 2019).

Representativeness: The data obtained was biased andnot representative because (1) not all of the regional health office sent CBMS data, only 16% reached the target (on January 10, 2019) and 24% did not implement CBMS (until June 1, 2018), (2) the blood serum specimen was not collected according to the technical guidance (thus making the serum adequate by 14%), while the urine specimen wasnot obtained, (3) the source of the data was derived only from the report submitted by the community health center, notfrom the hospitals and private clinics.**Stability**. During 2018 there was not any damage found inthe computer network system, causing the data uncovered.

4. Discussion

Variable need to be highlighted that human resources and money really important to it is important to achieve a goal in order to succeed both for activities that require training and operational. The lack of human resources was because the available human resource was not as required in theMinistry of Health decree No. 1116/Menkes /SK/VIII/2003. There were no trained experts graduated from the department ofepidemiology, but experts graduated from the department of health administration and policy. The numberwas considered insufficient in terms of quality and quantity in performing the surveillance tasks in theProvincial Health Office of East Java.The staffs were consisted of

oneepidemiologyexpert (Magister), twoepidemiology experts (Bachelor), twoapplied epidemiology experts, and one medical doctor(13).Mangkunegaran said that training is aprocess of teaching knowledge, expertise and attitude so that a person can carry out responsibilityaccording to the standard(14).

Epidemiological surveillance is systematic and constant analysis activities regarding disease or health problems and conditions that affect the increase and spread of diseases or health issues, to carry out effective and efficient countermeasures through the process of data collection, data processing and dissemination of epidemiological information to the providers of health programs(13). In data colletion, the researcher highlightedseveral delays in surveillance. The delays did not only occur in East Java province. A research conducted in semarang explicated that the delays were caused by several factors related to the officers' willingness and understanding about the works, the officers' length and amount of works, and the supervisors' attention and motivation (15).

Simplicity: The system wassimple but quite complicated to be implemented. Simplicity was also associated with the timeliness that might affect operational costs for system implementation (16).Referring to the Ministry of Health decree No. 1116/Menkes/SK/VIII/2003 on the number of staffs performing the surveillance taskthat should be consisted of one epidemiologyexpert (Magister), twoepidemiology experts (Bachelor), twoapplied epidemiology experts, and one medical doctor, the number of staffs in the Provincial Health Office of East Java was insufficient(13). The Laboratory test was done in BBLK. In 2012,according to the policy, the examination of the specimens hadto be done by 50% from the previous year, but the implementation was done gradually(17). Indonesia needed more specimens and genotypes examinations amongsuspected patients showing symptoms of fever and rash(5).Throughthe laboratory test, the cases could befound.

Flexibility: Flexibility was referred toa system that could adapt to changing information needs or operating conditions with liimited time, personnel, or budget. It couldalso be easily integrated with other systems. The report was sent using a private communication tool and credit. The implementation of CBMStook energy, time and cost. The specimen delivery required energy, time and cost(18).Without any coordination with the provincial health office, specimen fromthe regional health office was directly sent to BBLK and the information about the unconfirmed discovery of measles cases was only passed through whatssapp.

Data quality: Data quality reflected the completeness and the accuracy of the data recorded in the measles surveillance system implemented in East Java province, Indonesia. With the incompleteness of the data and the data that are not filled. Data quality included the number of people participating in this system(16). Not all 38 regional health offices actively implemented CBMS. Surveillance aimed toprovide information abouthealth problems to the high risk population so that any cases could be detected earlier (19).

Acceptability: Acceptability was reflected on the level of acceptance of a person or organizations in the existing system. The indicators were the number of parties that participated, the number of reports, and the accuracy of the health facilities, hospitals, laboratories, or private sector(18).The result of the observation revealed that 96% already implementedCBMS, but only 16% met the target, 79% did not meet the target, and 5% did not implement CBMS. The Provincial Health Officeof East Javafound out that only18% used CBMS system, and the World Health Organization recommended the participation of the private individual to controlmeasles rubella(5).The success of surveillance system wasdetermined by the used of surveillance information by the policy makers, decision makers, and stakeholders at various levels. One of the way to achieve surveillance system success was building network and communication amongresearchers, policy makers and decision makers(19).

*Timeliness:*Timeliness was interpreted as the interval between the steps taken in the surveillance system. Timelinesswas also needed to determine trends, outbreak or assess the impact of preventive efforts (18). In his research, Sutarman stated that case reporting delays in Semarang from the community health center to the regional health office was due to several factors related to the officers' willingness and understanding about the works, the officers' length and amount of works, and the supervisors' attention and motivation.

*Representativeness: R*epresentativeness and visible distribution were described based on the time and people in a population.The data were possibly biased because information aboutthe

characteristics of the population influencedby socio-economic status, access to health facilities, and geographical location was failed to be obtained. In addition, there wasalso no reports of mortality rate to be compared with the incidence rate and also reports of laboratory results(18).

*Stability:*Stability wasassociated with reliability and system availability. Reliability wasthe ability to collect, organize and provide data accuratelywithout errors. Availability wasthe ability to be operated whenever needed(18).The strength of this research was that the data used in data triangulation werereliabledata obtained in the form of aggregate data from the lowest to the highest level of health service. Meanwhile, the weakness of this study was thatthe data triangulation used only one subject, and thus further research was suggested to seek more subjects.

5.   Conclusion and Suggestions

Conclusion: The evaluation results based on the previously mentioned attributesfind outthat the program is not simple, flexible, stable, reliable, and representative, has inferior quality, donot show data received from a person as well as an organization, and has low timeliness.**Suggestions:**

Input: Addingtrained human resources and fund to increase the surveillance quality and the cooperation between hospitals and private clinics.

Process: Optimizing the system into an online, simple, and accessible system,increasing the knowledge of the officers at the community health centers, providing evaluation and supervision, and providing reagents.

Output: Improving the quality of measles surveillance system by improving the data completeness, the delivery compliance, and the information dissemination in reference to a higher quality surveillance program.

Acknowledgement

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